

CLAIMS

1. A process for producing an aliphatic polyester by
subjecting a cyclic ester to ring-opening polymerization,
5 which comprises adding water to a cyclic ester purified to
the extent that a water content is at most 60 ppm to
control an overall proton concentration in the cyclic ester,
thereby controlling at least one physical property among
melt viscosity, molecular weight and yellowness index of
10 the resulting aliphatic polyester.

2. The production process according to claim 1,
wherein the overall proton concentration in the cyclic
ester is calculated out on the basis of the total amount of
15 hydroxycarboxylic compounds and water contained as
impurities in the cyclic ester.

3. The production process according to claim 2,
wherein the hydroxycarboxylic compounds are an α -
20 hydroxycarboxylic acid and linear α -hydroxycarboxylic acid
oligomers.

4. The production process according to claim 1,
wherein the overall proton concentration of the impurities
25 contained in the purified cyclic ester before the addition
of water is within a range of 0.01 to 0.5 mol%.

5. The production process according to claim 3,
wherein the content of water in the purified cyclic ester
before the addition of water is at most 50 ppm, the content
of the α -hydroxycarboxylic acid is at most 100 ppm, and
5 the content of the linear α -hydroxycarboxylic acid
oligomers is at most 1,000 ppm.

6. The production process according to claim 1,
wherein water is added to the purified cyclic ester to
10 control the overall proton concentration in the cyclic
ester within a range of higher than 0.09 mol%, but lower
than 2.0 mol%.

7. The production process according to claim 1,
15 wherein when water is added to the purified cyclic ester to
control the overall proton concentration in the cyclic
ester, the amount of water added to the cyclic ester is
controlled on the basis of a relational expression between
a predetermined overall proton concentration in the cyclic
20 ester and a physical property value to be controlled so as
to give an overall proton concentration corresponding to a
targeted value of the physical property to be controlled.

8. The production process according to claim 7,
25 wherein the relational expression is a relational
expression of a linear model, double logarithm model or
semilogarithm model, which is obtained by conducting ring-

opening polymerization with the overall proton concentration in the cyclic ester varied, using, as a database, measured results of the melt viscosity, molecular weight or yellowness index of aliphatic polyesters obtained
5 by the ring-opening polymerization of the cyclic esters of the respective overall proton concentrations, and subjecting the database to regression analysis.

9. The production process according to claim 8,
10 wherein the relational expression is a relational expression of a semilogarithm model represented by the following expression (1), in which the overall proton concentration x in the cyclic ester is used as an independent variable, and the melt viscosity y is used as a
15 dependent variable,

$$y = a \cdot b^x \quad (1)$$

wherein, a and b are parameters.

10. The production process according to claim 1,
20 wherein water is added to the purified cyclic ester to control the overall proton concentration in the cyclic ester, the cyclic ester is heated and melted in the presence of a catalyst, and the cyclic ester in the molten state is then subjected to ring-opening polymerization to
25 deposit a polymer formed.

11. The production process according to claim 1,

wherein water is added to the purified cyclic ester to control the overall proton concentration in the cyclic ester, the cyclic ester is heated and melted in the presence of a catalyst in a melting vessel, the cyclic ester in the molten state is transferred to a polymerization equipment with a plurality of tubes capable of being closed and opened at their both ends, and the cyclic ester is then subjected to ring-opening polymerization in the closed state in the respective tubes to deposit a polymer formed.

12. The production process according to claim 1, wherein water is added to the purified cyclic ester to control the overall proton concentration in the cyclic ester, the cyclic ester is heated and melted in the presence of a catalyst in a melting vessel, the ring-opening polymerization of the cyclic ester in the molten state is allowed to progress in a reaction vessel equipped with a stirrer, a polymer formed is taken out, the polymer is cooled and solidified once, and solid phase polymerization is then continued at a temperature lower than the melting point of the polymer.

13. The production process according to claim 1, wherein the cyclic ester is a cyclic diester of an α -hydroxycarboxylic acid, or a lactone.

14. The production process according to claim 13, wherein the cyclic diester of the α -hydroxy-carboxylic acid is glycolide or lactide.

5 15. The production process according to claim 1, wherein the cyclic ester is glycolide alone or a mixture of at least 60 % by weight of glycolide and at most 40 % by weight of another cyclic monomer ring-opening-copolymerizable with glycolide.

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16. The production process according to claim 15, wherein another cyclic monomer is lactide.

17. The production process according to claim 15,
15 which obtains polyglycolic acid having a melt viscosity of 50 to 6,000 Pa·s as measured at a temperature of 240°C and a shear rate of 121 sec⁻¹.

18. The production process according to claim 15,
20 which obtains polyglycolic acid having a weight average molecular weight of at least 50,000.

19. The production process according to claim 15,
which obtains polyglycolic acid having a yellowness index
25 of 4 to 20.

20. The production process according to claim 15,

which obtains polyglycolic acid having a weight average molecular weight of at most 200,000 and a yellowness index of at most 10.